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### AHRC 150.01: Respiratory Care Lab 1

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**The University of Montana – Missoula College  
Respiratory Care Program**

**COURSE NUMBER AND TITLE:** **AHRC 150 RESPIRATORY CARE LAB 1**

**DATE REVISED:** Summer 2017

**SEMESTER CREDITS:** 1

**PREREQUISITE:** Acceptance into the Respiratory Care program

**LAB MEETS:** Wednesday, 1330hrs – 1630hrs

**FACULTY:** Nick Arthur

[nicholas.arthur@umontana.edu](mailto:nicholas.arthur@umontana.edu)

243-7836 (office)

Office: 308

Office Hours: M, W, F, 1200hrs – 1400hrs and by Appointment

**RELATIONSHIP TO PROGRAM:**

This course provides hands-on experience for students to apply cognitive knowledge from AHRC 131 to simulated hospital experiences. Psychomotor skills are developed to prepare the student for clinical hospital experience..

**COURSE DESCRIPTION:**

*Basic clinical competencies taught in AHRC 131 are studied in a laboratory setting.* Peer and instructor review are included.

**STUDENT PERFORMANCE OUTCOMES:**

In addition to objectives defined for AHRC 131 Fundamentals of Resp.Care, see topics listed in Course Outline, more specific objectives may be delineated according to topic. SEE: Unit Outlines section for this course.

Develop psychomotor skills and safe clinical practices in accordance with established Clinical Practice Guidelines ([www.rcjournal.com/cpgs/index.cfm](http://www.rcjournal.com/cpgs/index.cfm)) and modern safety initiatives.

Prepare the student with a solid foundation of equipment identification by therapy category, common name, brand name, set-up, function, troubleshooting, hazards, limitations, application; indications for change or discontinuance prior to entering the clinical arena.

Prepare equipment for the most commonly used methods for: humidity and aerosol therapy, bronchial hygiene therapy, medical gas therapy and drug therapy.

Handle medical gas cylinders safely and effectively.

**METHODS OF INSTRUCTION:** Lecture, Demonstrations, audio-visuals, hands-on participation and demonstration of basic competencies.

**STUDENT ASSESSMENT METHODS AND GRADING PROCEDURES:**

Students will be required to exhibit competency in various tasks and procedures. These competencies will be verified by peer and instructor review and a “check off” system utilized. Points will be awarded for successful completion of check offs as well as for midterm and final practicum exams and unannounced quizzes.

Mid/Final Exams: 60%

Checkoffs 40%  
(Approximate Breakdown)

**GRADING SCALE:**

A =	4.0	95-100%	C =	2.00	74-76%
A- =	3.67	90-95%	C- =	1.67	70-73%
B+ =	3.33	87-89%	D+ =	1.33	67-69%
B =	3.00	84-86%	D =	1.00	64-66%
B- =	2.67	80-83%	D- =	.667	60-63%
C+ =	2.33	77-79%	F =	0.00	

Students in the Respiratory Care Program **must have a “B-” (80% or greater) final grade in order to progress** within the program. Test questions will be based on unit objectives. Unit objectives are to be used as study guides.

**METHODS TO IMPROVE COURSE:**

Student evaluations and respiratory faculty assessment of course content.

**ATTENDANCE:** Class attendance is an integral part of this course. Exam dates will be announced. Only legitimate reasons for missing an announced exam will be accepted. Failure to appear for scheduled exams will result in zero points awarded. Expect periodic unannounced quizzes. There is no make-up for missed quizzes. SEE: TEST/QUIZ MAKEUP

**Please refer to your Student Manual for additional Policies and Student Resources.**

**ACADEMIC INTEGRITY:**

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by The University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at [http://life.umt.edu/vpsa/student\\_conduct.php](http://life.umt.edu/vpsa/student_conduct.php).

**DISABILITY ACCOMODATION:**

Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please speak with me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disabilities Services website at <http://www.umt.edu/dss/> or call 406-243-2243 (voice/text)

**Note: Instructor reserves the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances.**

**Cell Phones/Pagers:** Due to an increasing number of students, who own and use cell phones and pagers, it has become necessary to institute a policy during class times. As you are aware, these tools are distracting to an entire class. However, some students require them for business, which allows them to further their education. Please follow these guidelines:

If the cell phone/pager is not business or emergency related, please turn it off.

Use the vibrating option on your pager.

Do not listen to the messages in class. Please leave class quietly.

**CELL PHONES AND PAGERS MUST BE TURNED OFF DURING EXAM AND CLASS PRESENTATIONS.**

**SEATING:** Many classrooms have chairs to accommodate persons with disabilities. These chairs will display the international disability symbol and are assigned to a particular student. Please refrain from using these chairs or making adjustments to them unless the chair is assigned to you. If you think you may have the need for a specific chair, please contact Disability Student Services. Thank you for your cooperation.

**TEST/QUIZ MAKEUP:** Make-up exams and lab experiences **will only be given under extreme circumstances** and then only if: **a)** permission is granted *in advance* by the course instructor, or **b)** a written excuse is provided by a medical doctor. **The burden of proof is on the student**, so you must document and prove a justifiable absence. Not following this procedure prior to the exam will automatically result in a zero points awarded for the exam. Missed tests need to be made up within **one week** of the original date given. You are responsible for contacting the

Academic Support Center, 243-7826, to schedule the make-up. Failure to do so will result in a ***ZERO*** grade for the missed test.

The faculty senate guidelines concerning the issuance of incomplete grades will be followed. Attention to critical dates such as P/NP, drop, etc. is the responsibility of the student. Students wishing to drop the class after the drop deadline will need a documented justifiable reason for doing so. Dropping the class for fear of bad grade or to protect a GPA are **not** justifiable reasons. The principles embodied in the **Student Handbook Code** will be adhered to in this course.

Quizzes: Failure to be present for quizzes will result in a zero being recorded and used in computing your average. There will be no make-up opportunities for missed quizzes.

Homework: **It is the expectation that homework will be turned in when due.** If you are not present, it is your responsibility to see that it is in my mailbox by 4:00 p.m. on the due date **or a zero will be recorded and used in computing your average.**

**Student Decorum:** All students are expected to conduct themselves in a professional manner at all times in both the classroom and alternative settings. Discussions of an academic nature are encouraged and can enhance student learning. However, social conversation is not appropriate during lectures as it creates a distraction to students and faculty. Respect and courtesy will be shown at all times to peers, faculty, and the general public. **There are no exceptions to this policy at any time or under any circumstances.**

#### **REQUIRED TEXTS:**

**TITLE:** Basic Lab and Clinical Competencies for Respiratory Care, 4<sup>th</sup> Edition  
**AUTHOR:** White, et al. al.  
**PUBLISHER:** Delmar

**TITLE:** Clinical Assessment in Respiratory Care, 6<sup>th</sup> Edition  
**AUTHOR:** Wilkins, et al  
**PUBLISHER:** Mosby, **ISBN: 978-1-4160-5923-3**

**SEQUENCE OF STUDY:** The outline presented here will provide a roadmap of the sequence of study, practice and competency demonstration required to pass this course and enter clinical course next semester (AHRC 255). It is imperative that you follow this guideline very closely. Each unit has readings from AHRC 131, Respiratory Care Fundamentals, and the required competencies from White's text or this syllabus. **All competency forms must be signed by a peer and a laboratory instructor. The laboratory instructor must also sign the "Check-Off Log Sheet." (Found in AHRC 130 syllabus) This must be completed and turned in on the final class meeting. All competencies must be completed by this date in order to matriculate into the next semester of the program.** Over the course of the semester instructors may choose to integrate several competencies into a single patient scenario. These integrated lab scenarios will get you accustomed to the dynamic process of patient care. All competencies must be completed in the scheduled class times. **Friday afternoons are open lab days for practice. An instructor may or may not be present for these times.**

**LABORATORY ETIQUETTE:** Students will work in groups. Prepare and read materials/exercises before class begins. It is important to actively participate with the equipment. Get direct, hands-on experience. Be courteous, the lab will be crowded and cooperation and sharing of equipment is essential. Be attentive to mini-lecture/demonstrations by your instructor. Ask questions. Complete the laboratory exercises in the time allotted and hand it in. **Enjoy the lab setting.** All conditions are controlled and each performance step is outlined on the checklist. Concentrate on the technical skills and equipment – related aspects.

# **Unit outlines, Objective, and Readings:**

## **Unit I: Storage and Delivery of Medical Gases**

### **Objectives:**

See White's lab text, Ch. 12, Key Terms & Theory Objectives, p. 193, and Proficiency Objectives, p 205.

Identify valves, flow meters, compressed gas equipment that use: PIN, DISS, and American Standard safety connection systems.

Accurately identify compressed gas cylinder markings and tank ownership.

Identify compressed gas cylinder contents using at least two methods.

Discuss role of the CGA, NFPA; FDA regarding medical gases.

Identify/discuss our lab's gas and suction piping systems and pressure regulation.

Identify and describe gas cylinder valve components, tools to attach & operate; safety features.

Identify gas reducing valve stages, units of measurement, safety features, and purposes.

Identify flow regulator styles, units of measurement, and purposes.

Secure and "E" size oxygen cylinder onto a 2-wheeled cart. "Crack" cylinder and attach a flow regulator appropriate for patient transport. Check available gas contents. Set an accurate flow rate.

Calculate cylinder duration of use for "E" and "H" oxygen cylinders.

Transport an "H" size oxygen cylinder using a 3-wheeled cart, move it off the cart and apply a stationary "donut." Attach a pressure regulator, check tank pressure, adjust regulator pressure to 50 & 100 psi.

Discuss liquid oxygen, LOX, portable, stationary, and bulk supply systems, uses, hazards; limitations.

### **Reading:**

I. White, Chapter 12, Oxygen Supply Systems

### **II. Competencies**

Oxygen Supply System, p. 213

Regulator to "E" cylinder, p. 213

Regulator to "H" cylinder, p. 213

Liquid Oxygen System, p. 215

## **UNIT II: Medical Gas Therapy & Oxygen Administration**

### **Objectives:**

See White's lab text, Ch. 13, Key Terms & Objectives for Theory, CPGs, pp. 219-221; Objectives for Proficiency, p 231.

Identify: nasal cannula, simple oxygen mask, partial rebreathing oxygen mask, non-rebreathing oxygen mask (NRB), venturi oxygen mask, croup tent, isolettes, oxyhoods, transtracheal oxygen cannula system, oxygen conserving devices.

Discuss indications for use of oxygen therapy for adults in critical care and home settings per CPGs.

Correctly assemble, test, safely apply, troubleshoot, and monitor effectiveness of:

nasal cannula – simple oxygen mask – partial and non-rebreathing oxygen masks – venturi oxygen mask – croup tent – oxyhood – “E” cylinder oxygen conserving device.

Identify typical flow ranges for the above delivery devices and approximate FIO<sub>2</sub>s attainable.

Demonstrate and discuss the use of humidity in medical gas therapy.

Identify an oxygen (O<sub>2</sub>) analyzer and describe what it measures, limitations, uses.

Demonstrate calibration of O<sub>2</sub> analyzer, analyze at appropriate position in oxyhood, adjust FIO<sub>2</sub> delivery, document FIO<sub>2</sub> setting.

Identify an oxygen concentrator, its uses, hazards, limitations. Verify flow rate & FIO<sub>2</sub>.

Identify an Air/Oxygen blender, its alarms & uses. Analyze FIO<sub>2</sub> at various settings.

Briefly discuss Nitric Oxide (NO) therapy and application to specific populations.

Identify indications for Helium/Oxygen (Heliox) therapy.

Identify optimal Heliox delivery systems, indications for use, typical mixtures, hazards and flow considerations; patient monitoring.

Discuss carbon dioxide-oxygen (carbogen) therapy, indications, delivery devices; monitoring.

Identify some manufacturer brand names of the above equipment.

## **Reading**

I. White, Chapter 13, Oxygen Administration

II. **Competencies**

Liquid Oxygen Systems, p. 215

Oxygen Concentrators, p. 217

Oxygen Administration, p. 237

## **UNIT III: Humidity and Aerosol Medication Therapy**

### **Objectives:**

See White's lab text: Ch 14 - Key Terms & Objectives for Theory, p. 239, Objectives for Proficiency, p. 246; Ch 15 - Key Terms & Objective for Theory, p. 255, Objective for Proficiency, pp 267-268. SEE Updated CPGs listed below as Web-based...

Identify humidifiers by principle of operation, i.e., bubble, wick, cascade, pass-over and manufacturer brand names.

Identify infection control potentials and management with aerosol and humidification.

Recognize when humidification of medical gas is indicated.

Select humidification devices for basic medical gas interfaces, CPAP, and mechanical ventilation.

Identify aerosol delivery device brand names and functional design terminology, used to provide humidity or deliver pharmacological agents.

Describe principles of operation, efficiency & application of various large volume and small volume (SVN) nebulizers, continuous nebulizers (CNT) used to provide humidity or deliver medications.

Describe principles, uses, limitations, delivery devices for metered dose inhalers (MDIs).

Describe principles, uses, limitations dry powder inhalers (DPIs).

Properly prepare and instruct lab partner in use of MDI and DPI medication therapies, observe, troubleshoot, and reinstruct as needed. Demonstrate monitoring and assessment techniques.

Properly assemble, attached to compressed gas source, test, and safely apply basic SVNs, breath activated SVNs and continuous flow nebulizers. Troubleshoot and monitor effectiveness.

## **Reading:**

- I. White, Chapter 14 – Intro. Respiratory Pharmacology;  
Egan, Chapters 35 & 36 - Humidity & Bland Aerosol Therapy & Aerosol Drug Therapy
- II. **Web-based:** Fisher & Pykel humidity tutorial [www.fphcare.com](http://www.fphcare.com); MDI, DPI, SVN tutorials via Mayo Clinic at [www.mayoclinic.com](http://www.mayoclinic.com)
- III. **CPGs:** Assessing Response to Bronchodilator Therapy at Point of Care;  
Bland Aerosol Administration 2003 Revision,  
Humidification during Mechanical Ventilation;  
Selection of a Device for Delivery of Aerosol to the Lung Parenchyma;  
Selection of Device, Administration of Bronchodilator, & Evaluation of Response to Therapy in Mechanically Ventilated Patients.
- IV. **Competencies**  
Humidity and Aerosol Therapy, p. 273  
Small Volume Nebulizer Therapy, p. 275  
MDI Administration, p. 251  
DPI Administration, p. 253

## **UNIT IV: Lung Expansion Therapy**

## Objectives:

See White's lab text, Ch. 17 Key Term & Objectives for Theory, p 317-318; Objectives for Proficiency, p. 331.  
Refer to Web-based CPGs below for updated CPGs

NOTE: Defer IPV, Interpercussive Ventilation section, until Bronchial Hygiene unit.

Identify lung expansion equipment: Incentive Spirometers, IPPB, & CPAP devices, by brand name and functional design or style.

Per lab exercises and using a lab partner, properly assembly, test, position lab partner, instruct, apply, trouble shoot, modify, and monitor the above lung expansion devices.

For Incentive Spirometers, IPPB, & CPAP devices: Identify brand names; functional design styles.

Describe indications for use, routine frequency of ordering, duration of therapy, medications typically ordered if any, indications to reduce or increase frequency, indications to terminate therapy.

Use Clinical Practice Guidelines (CPGs) and listed readings or resources to identify indications for use, limitations, potential hazards, and appropriate patient populations for each type of lung expansion device.

**This is another equipment focused lab with emphasis on identification of types of devices, brand names, indications for use, safe application, adjusting equipment for patient needs, and trouble shooting.**

## Reading:

### I Reading

White, Chapter 17, Hyperinflation Therapy (exclude IPV until Bronchial Hygiene unit)

### II Web-based: CPGs: Incentive Spirometry, Intermittent Positive Pressure Breathing 2003 Revision, Use of Positive Airway Pressure Adjuncts to Bronchial Hygiene @ [www.rcjournal.com/cpgs/index.cfm](http://www.rcjournal.com/cpgs/index.cfm)

### III Competencies

Incentive Spirometry, p. 345

IPPB, p. 347

CPAP, p. 629

## UNIT V: Bronchial Hygiene Therapy

## Objectives:

See White's lab text, Ch. 16, Key Terms & Objectives for Theory & CPGs, pp 277-283; Objectives for Proficiency, p 291;

Identify benefits of and indications for bronchial hygiene therapy.

Describe conditions or disease states requiring bronchial hygiene therapy.

Describe adverse effects and monitoring of patients during bronchial hygiene therapy.

Identify equipment and devices used in bronchial hygiene therapy.

Describe typical ordering frequencies and durations of therapy for various devices.

Identify appropriate vs. inappropriate use on various patient populations.

Using lab partners and techniques used in Patient Positioning unit, use good body mechanics to properly align your partner for the following bronchial hygiene therapies:



- Postural Drainage & Percussion, using hand clapping, neo/peds wands; electronic percussors,
- Flutter Valve
- Acapella
- PEP therapy
- HFCWO (vest) therapy
- Adjunctive Breathing Techniques & Directed Cough

## **Reading:**

- I** White, Chapters 16, Bronchial Hygiene Therapy; Chapter 17, Hyperinflation Therapy, sections on Interpercussive Therapy, pp. 330-331
- II** **Web-based:** Try the Mayo Clinic site, [www.mayoclinic.com](http://www.mayoclinic.com)  
Google: Hill-Rom HFCWO airway clearance therapy hospital to home as taught by Mark Nystrom, RRT at [www.columbustech.edu/health\\_sciences/](http://www.columbustech.edu/health_sciences/) This is a PDF and short Power Point presentation.
- III** **Competencies**  
Chest Percussion and Postural Drainage, p. 307  
PEP Mask Therapy, p. 309  
Flutter valve, p. 311  
HFCWO, p. 313  
Intrapulmonary Percussion Ventilation (IPV), p. 349  
Adjunctive Breathing, p 315

## **UNIT VI: Maintaining a Patent Airway**

### **Objectives:**

An introduction to principles of maintaining the patient airway

Examination of supra-glottic artificial airways:

- Oral pharyngeal airways (OPA)
- Nasal pharyngeal airways (NPA)
- Laryngeal mask airways (LMA)
- Indications for use
- Contra indications for use
- Technique/procedure for use

Examination of sub glottic airways:

- Endo tracheal tubes (ETT)
- Double lumen ETT
- Combitube
- Tracheostomy tubes
- Indications for use
- Contra indications for use
- Technique/procedure for use

**This unit is designed to be introductory in nature. We may or may not complete check offs depending upon our progress through the material.**

**The primary goal is to familiarize the students with basic techniques and theory of airway protection in preparation for BLS certification (AHRC 130). Artificial airways will be heavily emphasized in the spring prior to initial student-clinical exposure and in preparation for coursework on adult critical care**